What is claimed is:

1. A method for maintaining blade tip clearances under part load turbine operation comprising the steps of:

operating a turbine engine under part load, the engine having a rotor with discs on which a plurality of turbine blades are attached;

supplying cooling air to the rotor and discs at a substantially constant design rotor cooling temperature; and

reducing the temperature of the cooling air supplied to the rotor and discs to a temperature below the design rotor cooling temperature,

wherein exposure to the reduced temperature rotor cooling air causes the rotor and discs to shrink.

2. The method of claim 1 wherein the substantially constant design cooling temperature is from about 350 degrees Fahrenheit to about 480 degrees Fahrenheit.

3. The method of claim 1 wherein the turbine engine includes a compressor section having an inlet and an outlet, a plurality of inlet guide vanes being movably positioned at the compressor inlet.

4. The method of claim 3 further including the step of:

moving the inlet guide vanes to a closed position so as to reduce the mass flow of air through the turbine engine,

whereby the combustor exit temperature increases and the compressor exit temperature decreases.

5. The method of claim 1 wherein the temperature of the cooling air is reduced to about 150 degrees Fahrenheit at about 70 percent load.

6. The method of claim 1 wherein the temperature of the cooling air is reduced to less than about 350 degrees Fahrenheit.

7. A turbine engine assembly comprising:

a turbine engine having a compressor section, a combustor section and a turbine section, the compressor section having an inlet and an exit, the turbine section including a rotor with discs on which a plurality of turbine blades are attached, the turbine engine configured so as to supply cooling air to the rotor and discs at a substantially constant design temperature, wherein the engine is operating under a part load condition; and

a cooling circuit configured to reduce the cooling air temperature to a temperature below the design temperature.

8. The assembly of claim 7 wherein the cooling circuit includes an intermediate pressure kettle boiler, a low pressure kettle boiler and a heat exchanger connected in series.

9. The assembly of claim 8 wherein the heat exchanger uses economizer water as the sink.

10. The assembly of claim 8 wherein the heat exchanger uses condenser water as the sink.

11. The assembly of claim 8 further including a circuit for at least partially bypassing the heat exchanger.

12. The assembly of claim 7 wherein the cooling circuit reduces the temperature cooling air to below about 350 degrees Fahrenheit.

13. The assembly of claim 7 wherein the cooling circuit includes at least one heat exchanger.

14. The assembly of claim 13 wherein the at least one heat exchanger is a fin-fan cooler.

15. The assembly of claim 7 wherein the turbine engine is part of a simple cycle system.

16. The assembly of claim 7 wherein the turbine engine is part of a combined cycle system.

17. The assembly of claim 7 wherein the cooling circuit reduces the rotor cooling temperature to about 150 degrees Fahrenheit when the engine is at about 70% load.

18. The assembly of claim 7 wherein the substantially constant design cooling temperature is from about 350 degrees Fahrenheit to about 480 degrees Fahrenheit.